BOTANY.—*Spot anthracnoses in the Pacific Coast States.*[1] ANNA E. JENKINS, U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, A. A. BITANCOURT, Instituto Biologico, São Paulo, Brazil, and FLORA G. POLLACK, U. S. Bureau of Entomology and Plant Quarantine.

A summary of the distribution of spot anthracnoses[2] in the United States, prepared in 1938 (*6*) showed that five of these diseases had been recorded in the Pacific Coast States (Washington, Oregon, and California), viz:

(1) anthracnose of grape (*Vitis*), caused by *Elsinoë ampelina* (DBy) Shear;
(2) anthracnose of brambles (*Rubus*), caused by *E. veneta* (Burk.) Jenkins;
(3) anthracnose of snowberry (*Symphoricarpos*), caused by *Sphaceloma symphoricarpi* Barrus and Horsfall;
(4) anthracnose of rose (*Rosa*), caused by *S. rosarum* (Pass.) Jenkins;
(5) anthracnose of Labrador-tea (*Ledum*), caused by *E. ledi* (Pk.) Zeller.

All five diseases were known in Oregon and all but snowberry anthracnose and rose anthracnose in Washington. The exception for California was grape anthracnose, and the absence of this disease in that state has since been commented upon by Smith (*11*). The existence of gray scab of willow in California has been traced (*3*) by virtue of the presence of typical lesions of the diseases on herbarium specimens of *Salix lasiolepis* Benth. collected in Humboldt County (1933), Santa Clara County (1904), and San Diego County (1931). This disease was recognized as a spot anthracnose in 1943 (*9*) and its pathogene named *S. murrayae* Jenkins and Grodsinsky (*3*, p. 56) in honor of its discoverer.

Additional records of spot anthracnoses in the Pacific Coast States now available are assembled in this article, and in four instances their pathogenes are described as new. Findings in western Washington and Oregon are based on specimens emanating from the Special Survey in the General Vicinity of Ports of Entry of the U. S. Bureau of Entomology and Plant Quarantine (1943–45). These were referred to Jenkins because of their apparent spot anthracnose nature, and where identification or corroboration was sufficiently positive at the time they were reported in Field's *Summary of the more important plant diseases taken in connection with the . . . Survey . . .* (*1*). The spot anthracnose on salal (*Gaultheria shallon* Pursh), however, came to attention only in 1946, during routine examination of the particular Special Survey specimen concerned, by Pollack, recent coauthor in the description of a new species of *Elsinoë* (*10*). The new records of spot anthracnoses in southern California are afforded by specimens collected in that part of the state in 1942 by H. S. Fawcett and A. A. Bitancourt, together with certain specimens communicated to the first two writers by Fawcett.

As a result of the Special Survey, rose anthracnose was found in Pacific County, Wash. (*1*, 29, p. 182) and gray scab on Pacific willow (*Salix lasiandra* Benth.) both in Pacific County, Wash. (*1*, 28, p. 274; *5*) and in Clatsop County, Oreg.

Of particular significance was the discovery in western Washington and Oregon of a spot anthracnose not previously known in the United States, namely, anthracnose of pome fruits (*7*, *8*). The single finding on quince from Washington of what appears to be this disease (*8*) had been preceded by an earlier discovery in Brazil not previously reported. At Campinas, São Paulo, in June 1939, Bitancourt discovered presumably the same leaf spot on quince leaves, and isolated the pathogene. Following the initial discovery of this spot anthracnose in the Pacific Northwest, the Emergency Plant Disease Survey of the Bureau of Plant Industry, Soils, and Agricultural Engineering cooperated in a further search for this disease in western Washington and Oregon. The several counties in these states in which the disease was found during 1943–44 are indicated on a map (*8*).

Thus far anthracnose of pome fruits has

[1] Received November 5, 1946.
[2] Term adopted for collective reference to diseases caused by *Elsinoë* and *Sphaceloma*.

been reported only on leaves but in the case of apple also on fruit. An example of twig attack is available through a Brazilian interception of a diseased apple twig from Portugal, made in Santos, State of São Paulo, in 1932, by J. D. Deslandes. The specimen in question was identified by Bitancourt who found the perfect stage of

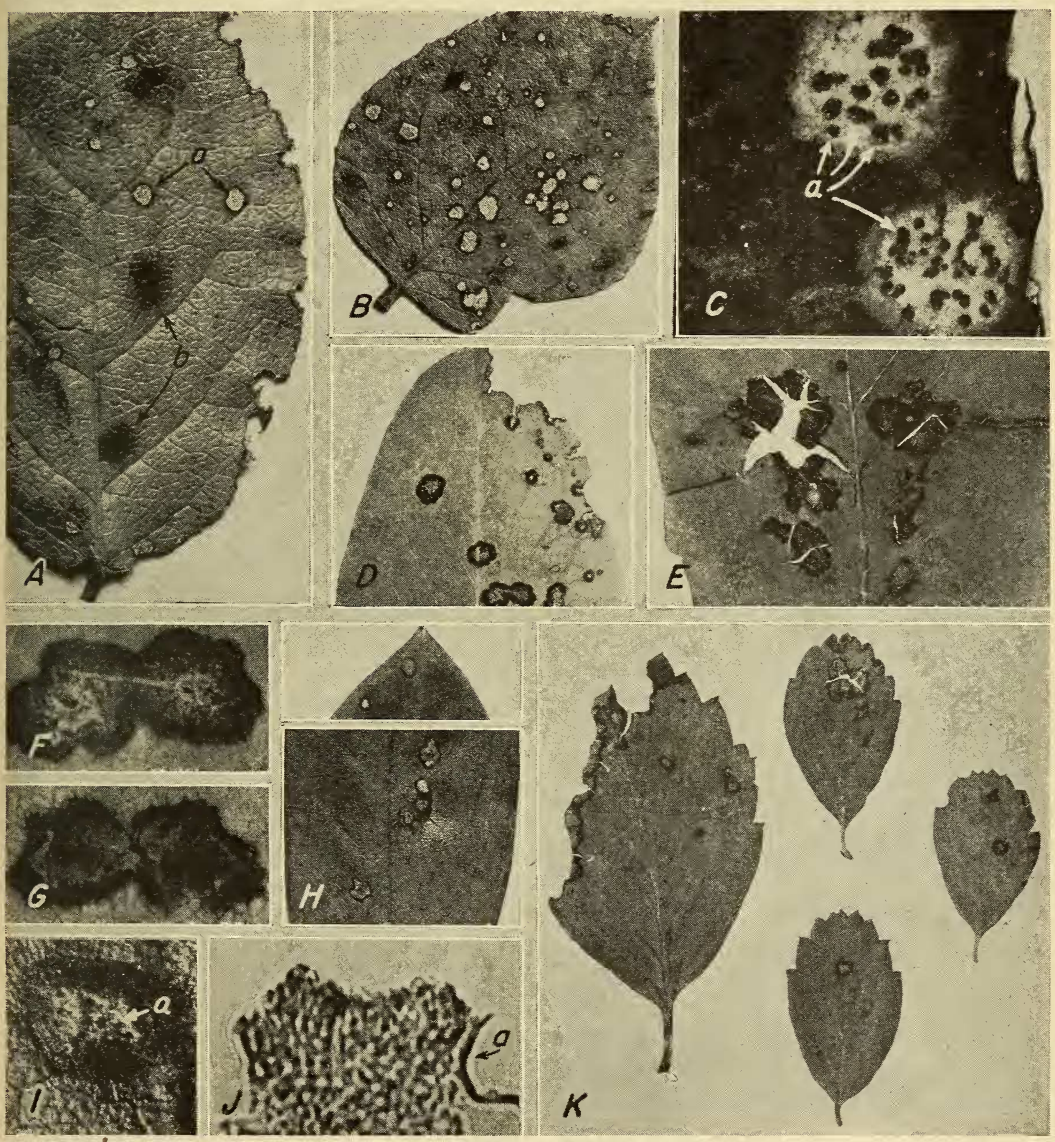

Fig. 1.—A–C, Lesions on *Gaultheria shallon* from western Washington: A, *a*, light-colored spots on upper leaf surface caused by *Elsinoë*, apparently *E. ledi; b*, dark spots caused by *Phyllosticta gaultheriae*, Special Survey collection, 1945, ×1. B, C, *Elsinoë* leaf spot on the Bartholomew specimen, 1909; B, ×1; *C*, *a*, ascomata, ×12. D–G, Leaf spot on *Arbutus menziesii* caused by *Sphaceloma mattirolianum* (?), specimen collected in California by Fawcett and Bitancourt, 1942; D and E, ×1; F, individual leaf spot from D, ×5; G, reverse of same leaf spot, ×5. H, *Sphaceloma* leaf spot on *Rhododendron macrophyllum*, Special Survey collection in western Washington, 1943, ×1. I, Leaf spot on *Cercocarpus betulifolium* var. *multiflorus* caused by *S. cerocarpi*, specimen collected by Fawcett and Bitancourt in California, 1942, *a*, acervuli, ×10. J, *a*, Fructification of *S. cercocarpi*, *a*, ruptured epidermis, ×500. K, *Cercocarpus* leaf spot, ×1. Photographs by R. L. Taylor (A–C, H), Bitancourt (D–G), and Lillian A. Guernsey (I–K).

the pathogene (*Elsinoë piri* (Woronich.) Jenkins) fruiting on the cankers. Only the conidial stage of the fungus (*Sphaceloma pirinum* (Pegl.) Jenkins) (*8*) was observed on the specimens from Washington and Oregon.

Among new suscepts of spot anthracnoses discovered as a result of the Special Survey are the two ericaceous plants, coast rhododendron (*Rhododendron macrophyllum* G. Don) and salal. In the case of coast rhododendron limited spotting on only two leaves was observed (Fig. 1, H). The collection was made in Skagit County, Wash., on August 31, 1943, and *Sphaceloma* sp. was definitely evident on the lesions.

The specimen on salal examined by Pollack is from Clallam County and is dated May 25, 1945. In addition to the light-colored, purple-margined *Elsinoë* leaf spot (Fig. 1, A, *a*) there is a less distinctive brown leaf spot surrounded by an indefinite discoloration (Fig. 1, A, *b*). This leaf spot is caused by *Phyllosticta gaultheriae* Ell. and Ev.

This same combination of leaf spots or apparently only the more conspicuous *Elsinoë* spot is represented in the Mycological Collections of the Bureau of Plant Industry as Pollack ascertained. Pertinent specimens are the following: Bainbridge Island, Kitsap County, Wash., July 23, 1909, E. Bartholomew (E. Barth. Fungi Columbiani no. 3160) (Fig. 1, B and C); Lake Isobel, Snohomish County, Wash., February 22, 1931, W. H. Wheeler; Grants Pass, Oreg., September 5, 1916, J. R. Weir 688 and 691. A fifth specimen of the *Elsinoë* found in the Mycological Collections and only now recognized as of that genus, transfers the first known record from Clallam County, Wash., to August 7, 1929. The collector of this earlier specimen is E. P. Meinecke.

In general appearance this spot anthracnose on *Gaultheria* resembles that of *Ledum*. In either case the *Elsinoë* produces the perfect stage abundantly and there is a similarity in the fructifications. Microscopic comparison of the *Elsinoë* on *Gaultheria* with an authentic specimen of *E. ledi* showing mature spores revealed no appreciable difference in the two species. Incidentally, the presence of muriform spores in *E. ledi* is mentioned here, as they are not noted in Zeller's (*12*) revised description of this species. On the basis of this favorable comparison with *E. ledi*, the *Elsinoë* on salal is identified for the present at least as that species. It remains to be determined, of course, whether the *Elsinoë* from either suscept is capable of infecting the other.

Among the findings of spot anthracnoses in southern California were those on the ericaceous genus *Arbutus*. On May 21, 1942, in the Santa Ana Botanical Gardens, Orange County, Fawcett and Bitancourt observed a prominent leaf spot on *A. menziesii* Pursh (Fig. 1, D–G), from which *Sphaceloma* was isolated by Bitancourt. This disease is identified tentatively at least as identical with anthracnose on leaves of strawberry-tree (*A. unedo* L.) caused by *S. mattirolianum* (Sacc. and D. Sacc.) Jenkins (*4*). What is evidently this disease of strawberry-tree was observed at Riverside, Riverside County, Calif., by Fawcett in January 1944. To the writers' knowledge, these constitute the first records of this particular spot anthracnose in United States. Other spot anthracnoses found in California are those of Catalina cherry (*Prunus lyonii* Sarg.) collected in Santa Barbara March 5, 1936, by M. W. Gardner; hollyleaf cherry (*P. ilicifolia* Walp.), Griffith Park, Los Angeles, October 12, 1939, by H. S. Fawcett, D. E. Bliss, and A. A. Bitancourt (811); and tree tobacco (*Nicotiana glauca* Graham), Ventura County, May 12, 1942, by Fawcett and Bitancourt (911).

FIG. 2.—A, B, Spots on leaves of *Ribes grossularia* caused by *Sphaceloma ribis*, Special Survey collection in Western Washington, 1943; A, ×1; B, ×3½. C, *a*, Acervulus of the *Sphaceloma*, *b*, ruptured epidermis, *c*, hyperplastic host tissue. D–F, Spots on *Viburnum opulus* var. *roseum* (D and F) caused by *S. viburni* (E): D, *a*, dark acervuli on a leaf spot, ×12; F, *a* acervulus, *b*, ruptured epidermis, ×500; F, ×1. G, H, Scab of *Hedera helix* caused by *S. hederae*, from California, 1942, comm. H. S. Fawcett: G, ×1; H, ×12. I–M, *S. hederae* on *H. helix* from North Carolina, Coll. and comm. Westcott: I, *a*, Fructification on a lesion, ×12; J, *a*, dark intraepidermal hyphae giving rise to conidiophores (*b*), *c*, ruptured epidermis; K–M, more mature development of the *Sphaceloma*, *a*, conidiophores, *b*, conidia, ×500. Photographs by Taylor (A, B, D, F, G, H, and I), Guernsey (C), and M. A. Jaeger (E and J–M).

The four remaining spot anthracnoses to be reported here appear to be new to science. Those found as a result of the Special Survey affect gooseberry (*1*, 29, p. 182) and snowball (*1*, 28, p. 970). The distribution of all four diseases will be given below follow-

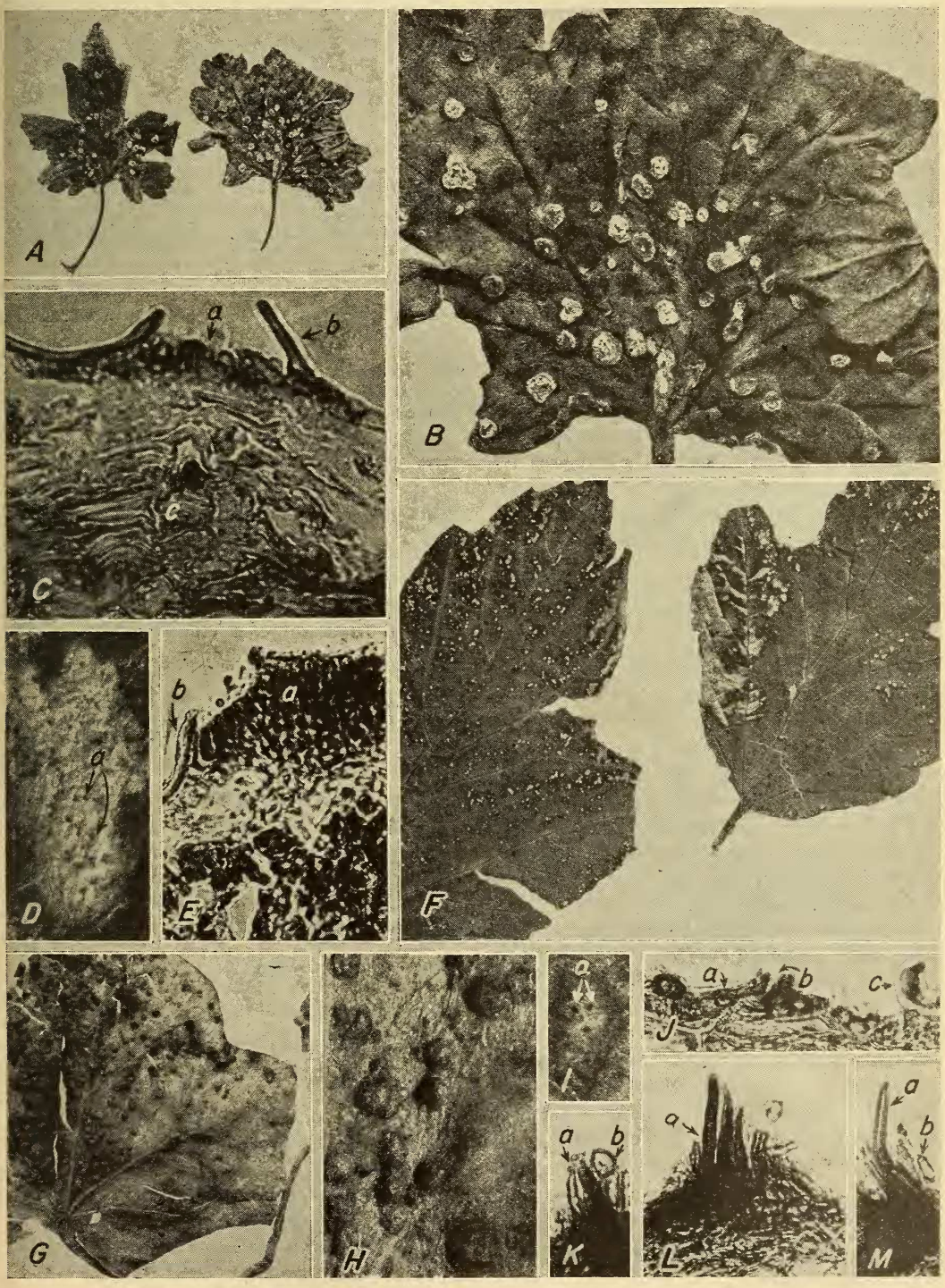

FIG. 2.—(See opposite page for legend.)

ing brief diagnoses of their pathogenes. The translations into Latin were made by Miss Edith K. Cash.

Sphaeceloma ribis sp. nov., Jenkins and Bitancourt
FIG. 2, A–C

Maculae in foliis numerosae, conspersae, interdum in nervis circulares vel sub-circulares, aliquando paucae coalescentes, plerumque usque 1 mm in diam., supra prominentiores elevatae, griseae margine inconspicuo luteo ex acervulis atro punctatae; acervuli intraepidermales, dein erumpentes, usque 63μ in diam. et 40μ crassi; conidiophora obscura, continua vel 1–3 septata, usque 15μ, e stromate pallido oriunda; conidia variabilia, parva, hyalina vel colorata, sphaericalia usque 3μ in diam. ad elliptica, 8$\times$5μ.

Distribution.—Producing the disease "scab of gooseberry" on leaves of *Ribes grossularia* L. (Saxifragaceae) in Washington.

Specimen examined.—Chinook, Pacific County, Wash., October 9, 1943, R. F. Wilbur (Wilbur 53) (USM 74759, IB 4877, Type).[3]

Sphaceloma viburni sp. nov., Jenkins and Bitancourt
FIG. 1, D–F

Maculae in folis paucae usque numerosissimae, dispersae, etiam saepe nervisequentes vel marginales circulares usque triangulares vel irregulares, minutae ad 2 mm diam., vel plus minusve extensae, supra prominentiores, centro griseae usque albae, margine brunneo interdum ex acervulis atropunctatae, acervuli intraepidermales, dein erumpentes, compacti, pulvinati, usque 61–100μ in diam. et 21–50μ crassi; conidia non visa.

Distribution.—Producing the disease "anthracnose of snowball" on leaves of *Viburnum opulus* var. *roseum* L. and *V. suspensum* Lindl. (Caprofoliaceae) in Washington and California.

Specimens examined.—On *Viburnum opulus* var. *roseum* L.: Roseburg, Wakiakum County, Wash., October 8, 1943, F. S. Semans (Wilbur 148) (USM 74690, IB 4679 Type). Chinook, Pacific County, Wash., November 30, 1944, M. J. Forsell (Forsell 1167, 1168, 1169 and 1170).

On *Viburnum suspensum* Lindl.: Riverside, Riverside County, Calif., March 28, 1942, H. S. Fawcett, R. H. Buller, and A. A. Bitancourt 904 (USM 74384, IB 4402).

Sphaceloma cercocarpi sp. nov., Bitancourt and Jenkins
FIG. 2, I–K

Maculae in foliis plus minusve sparse conspersae, interdum marginales, circulares vel sub-circulares, interdum coalescentes, usque 3 mm diam., supra prominentiores, centro pallidae, interdum margine subelevato purpureo; acervuli in area centrali papuliformes, intraepidermales, dein erumpentes, compacti, pallidi, usque 57–60μ lati, 44–70μ crassi, interdum confluentes; stroma valde evolutum, stratum conidiferum pallidum, compactum, 26μ crassum; conidia non visa.

Distribution.—Producing the disease "anthracnose of birch-leaf mahogany" on leaves of *Cercocarpus betulifolius* var. *multiflorus* Jepson (Rosaceae) in California.

Specimen examined.—Santa Ana Botanical Gardens, Orange County, Calif., May 2, 1942, H. S. Fawcett and A. A. Bitancourt 910 (USM 74383, IB 4404, Type).

Sphaceloma hederae sp. nov., Bitancourt and Jenkins
FIG. 2, G–M

Maculae in foliis saepe numerosissimae, conspersae, vel in area una dense aggregatae, circulares vel subcirculares, verruciformes, interdum centro depressae, brunneae, centro pallido vel obscuro, saepe confluentes, infra prominentiores, 1–5 mm in diam., status *Sphaceloma* hyphomycetoideum potius quam acervuloideum; conidiophora ex hyphis intraepidermibus, in caespitibus usque 53–200μ in diam., aggregatis, in longitudinem variabilia, usque 47μ longa, 5.3μ lata, recta vel curvata, plerumque acuta vulgo continua, interdum 3-septata; conidia variabilia parva, hyalina vel colorata, sphaericalia, usque 6μ diam. vel elliptica, continua, ad septata, 2.5–7.8$\times$1.7–5.3μ.

Distribution.—Producing the disease "scab of English ivy" (*2*) on leaves of *Hedera helix* L. (Araliaceae), in California, North Carolina, and São Paulo, Brazil.

[3] USM = Mycological Collections of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Plant Industry Station, Beltsville, Md. IB = Secção de Fitopatologia, Instituto Biologico de São Paulo, Brazil.

Specimens examined.—Vicinity of Silver Lake, Los Angeles County, Calif., May 28, 1940, R. G. Woglum (comm., H. S. Fawcett). Uplands, San Bernardino County, Calif., about June 1942, H. Cavers (comm. H. S. Fawcett). Mar Vista, Los Angeles County, Calif., March 8, 1943, A. Stein (comm. H. S. Fawcett).

Asheville, N. C., October 18, 1946 (Coll. and comm. C. Westcott) (USM 90270, IB 5101, Type).

São Paulo, Brazil, May 3, 1943, A. A. Bitancourt 972. Isolations were made from two of these specimens, that collected at Mar Vista and that São Paulo by Bitancourt.

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ENTOMOLOGY.—*New species of North and Central American mites of the family Penthaleidae (Acarina).*[1] EDWARD W. BAKER, *U. S. Bureau of Entomology and Plant Quarantine.* (Communicated by ALAN STONE.)

The family Penthaleidae Oudemans, 1931, is composed of four genera, two of which contain species of economic importance.

Essig[2] and Campbell[3] report that *Penthaleus major* (Dugès)[4] is a pest of peas in California and that it feeds on clover, oats, wild mustard, and lupine. Essig has also observed it attacking a springtail, *Achorutes armatus* Nicolet, which was swarming on the surface of ditch water. It has caused serious damage to wheat in certain areas in Texas and has been found on wheat and barley in Arizona and Oklahoma. In Australia this species is a serious pest of clover and vegetable crops,[5] and Andre[6] records it as injurious to peas and lettuce as well as other vegetables in France.

Halotydeus destructor (Tucker) causes extensive damage to vegetable and leguminous crops in Australia and South

[1] Received October 22, 1946.

[2] ESSIG, E. O. California Dept. Agr. Monthly Bull. **28** (7, 8, 9): 507–508, fig. 1. 1939.

[3] CAMPBELL, R. E. California Dept. Agr. Monthly Bull. **30** (3): 312–314. 1941.

[4] *Notophallus dorsalis* Banks, 1902 (Can. Ent. **34**: 172), and *N. viridis* Banks, 1917 (Ent. News **28**: 193), are here considered as synonyms of *Penthaleus major* (Dugès) (new synonymy).

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